



Conductive 3000 Polycarbonate Carrier

Technical Data – September, 1999

Product Description

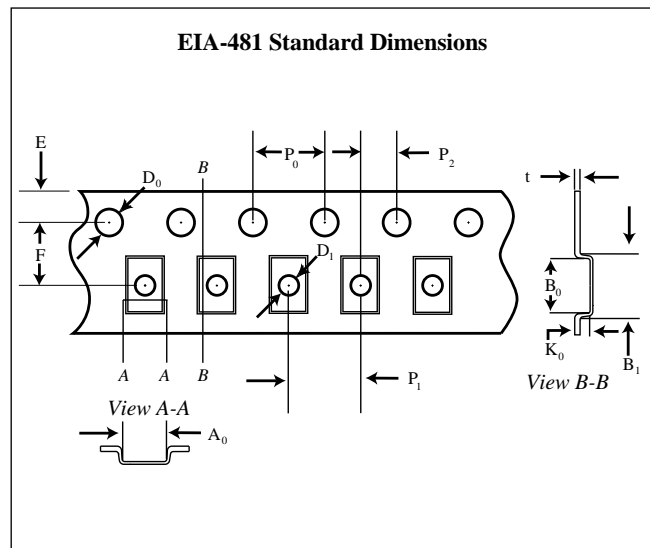
3M™ Conductive 3000 Polycarbonate Carrier, used in conjunction with a suitable 3M cover tape, serves as a reliable and convenient means of helping protect and transport electrostatically-sensitive electrical and electronic devices, and precisely delivering them to the assembly point. 3000 polycarbonate carrier is a continuous, splice free, conductive polycarbonate carrier with precisely formed pockets to ensure component fit to ANSI/EIA standards. 3000 polycarbonate carriers are available in a broad selection of pocket designs with dimensions to accommodate a variety of common electrical and electronic parts. Customized 3000 polycarbonate carrier, including those for connectors, with dimensions specific to your requirements, is also available upon request.

Construction

Embossed, conductive, heat-resistant, polycarbonate film.

Dimensional Properties

3M Conductive 3000 Polycarbonate Carrier meets the ANSI/EIA-481 Standard for the dimensions illustrated below.

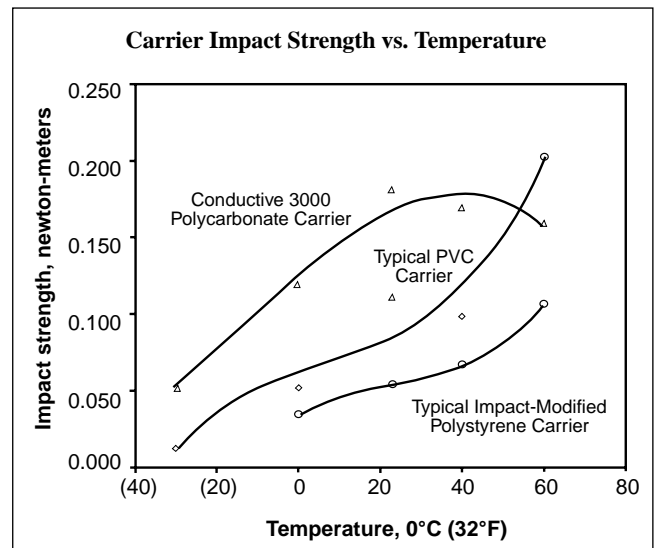


Product Format

3000 polycarbonate carrier is available as continuous, splice-free, 8mm through 120mm carrier on recyclable 560mm diameter cardboard supply reels in planetary wound format. 8mm and 12mm carriers are also available in a level-wound format. Reel capacity will typically be from 30 to 1,000 meters, depending upon the pocket depth, pitch, and winding format.

Typical Mechanical Properties – Impact Strength

In practical use, many polymers exhibit poor impact and crack resistance at low temperature, and may prove inappropriate for use in carrier tape exposed to such temperatures during shipping. 3000 polycarbonate carrier's tough polycarbonate construction provides excellent resistance to cracking at temperatures where many other typical carriers may fail. The following graph depicts the modified IZOD impact strength of SO-14 carriers tested at several temperatures. The impact-modified polystyrene carrier was too brittle to test below 0°C (32°F) in this study.



Note: The technical information and data presented here should be considered representative or typical only, and should not be used for specification purposes.

Typical Mechanical Properties – Shrinkage

Unlike many polyvinyl chloride and polystyrene carrier tapes, which typically shrink in excess of 0.5% after 24 hours of exposure to 60°C (140°F), 3000 polycarbonate carrier exhibits shrinkage of less than 0.1%, even after 24 hours exposure at 85°C (185°F). This compares favorably to the EIA-481 standard which stipulates that the P₀-10, or ten-pitch tolerance, maintain a dimension of 40.0 mm ± 0.2 mm, an implied tolerance of ±0.5%. Carrier shrinkage can result in problems with feeding, pocket position, and, in the case of the pocket dimensions, parts sticking in the pockets. The extent of shrinkage in cold-formed polyvinyl chloride or polystyrene carrier pockets can be rapidly accelerated by exposure to elevated temperature, and will depend upon the duration of exposure and the maximum temperature reached. Exposure of many of these other carriers to as little as 24 hours at 50°C (122°F) can cause shrinkage in such carriers to exceed the implied EIA-481 dimensional tolerance.

Carrier Shrinkage after 24 Hours

Temperature	3M 3000 Carrier	Typical PVC	Typical Polystyrene
60°C (140°F) , 85%RH	<0.1%	≥1.0%	≤0.5%
85°C (185°F)	<0.1%	>1.0%	>0.5%

Electrical Properties

The electrical and triboelectric properties of 3000 polycarbonate carrier have been engineered to help provide protection of static-sensitive components through an effective balance between the electrostatic shielding and electrostatic decay properties of the carrier. 3000

polycarbonate carrier is electrically conductive, exhibiting a nominal surface resistivity in the pocket of $\geq 10^4 \Omega/\text{square}$ and $\leq 10^8 \Omega/\text{square}$. The surface resistance of 3000 minimizes dV/dt, affording ESD protection to devices in Classes I through III. 3000 carrier also exhibits triboelectric properties which may be appropriate for packaging electrostatically-sensitive components.

Camber

3M Conductive 3000 Polycarbonate Carrier in a planetary format meets the EIA-481 Standard for camber: not greater than 1mm in 250 lineal millimeters. For 8mm and 12mm carriers in the level-wound format, camber will be not greater than 2mm in 250 lineal millimeters.

Storage Conditions

3M Conductive 3000 Polycarbonate Carrier should be stored indoors, in its original packaging, in a controlled climate environment, typically at or below 35°C (95°F) and 70% relative humidity. Storage conditions should not exceed 85°C (185°F) for prolonged periods, and the product must be protected from exposure to direct sunlight. Exposure to elevated humidity reduces the compressive strength of corrugated, cardboard containers. The recommended stacking height must be followed to avoid damaging the packaged product. It is recommended that the product be used on a “first-in, first-out” basis.

Shelf Life

It is recommended that 3M Conductive 3000 Polycarbonate Carrier be used within 5 years from the date of manufacture when stored according to the recommended storage conditions.

Conductive 3000 Polycarbonate Carrier

Description		Units	Typical Performance	Test Notes	Test Method
Material Properties	Type Max, Usable Temperature	°C (°F)	Polycarbonate 125 (257)	1	
Physical Properties	Tensile Strength (Yield)	MPa (Kpsi)	63 (9.1)	2	ATSM D 638
	Tensile Strength (Break)	MPa (Kpsi)	72 (10.5)	2	ATSM D 638
	Impact Strength	Nm (F-lb/in)	>.15 (1.32)	3	ATSM D 256
	Shrink	%	<0.1	4	ASTM D 955
	Camber	mm (in)	<1.0 (0.39)	5	EIA 481
	Optical	%	Opaque	6	ASTM D 1003
Electrical Properties	Resistivity	Ohms/sq	5.0E10 ⁵	7	ASTM D 257
	Static Decay	Seconds	0.01	7	FTMS 101B, method 4046
Chemical Properties	Extractable Ionics (Cl ⁻ , NO ³ , SO ₄ ⁻ , Na ⁺ , K ⁺ , Ca ⁺⁺)	ppm	<5	8	MIL STD 883E
	Flammability Rating	UL94	V-2	9	UL94
Product Format	Reel Type	Material	Reinforced Cardboard		
	Reel Hub Inside Diameter	mm (in)	76.2 (3.0)		
	Pockets Per Reel	Count	Varies per pitch		
	Length	m (f)	Varies per Ko		

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Test Notes:

1. Engineering grade resin.
2. Tensile tests are conducted at 21°C (70°F), 50% RH under controlled conditions with a constant rate of jaw separation of 100mm/minute from an initial separation of 126mm. Yield strength is the force which produces 5% elongation of the sample. Breaking strength is the ultimate strength for the material at the break point.
3. Impact strength testing utilizes a mandrel to hold a section of the material under test. A weight is allowed to strike the material from a known radius and after the strike the swing is measured vs free swing and the strength of the material is calculated from the difference.
4. Shrink is measured at 60°C (140°F)/85% RH as well as the 85°C (185°F) after 24 hours exposure and expressed in percentage of the initial measurement.
5. Camber is a measurement of the weave of the material. Measured over a 250mm length.
6. Optical properties are measured using a spectrophotometer and measuring wavelengths from 450 to 800mm. Material is considered opaque if light transmission is less than 1%.
7. Resistivity tests are conducted at 21°C (70°F), 50% RH under controlled conditions. Resistivity is measured at the sealing surface of a typical carrier using the defined test method. Specification tolerances for this carrier is $10^4 \leq R_s \leq 10^8$. Static decay is measured with an Electrotech Systems Static Decay Meter Model 406-C, according to Federal Test Method Standard 101, method 4046.
8. Chemical extraction is measured using 20-hour water extraction test as defined in the test method MIL STD 883E, test method 5011. Resultant solutions are measured using chromatography.
9. Flammability rating is defined within the UL94 test method from Underwriters Laboratories. Thickness tested was 1.57mm. Flammability results are based on small-scale laboratory tests for comparison purposes only and do not necessarily represent the hazard presented by this or any other material under actual fire conditions.

Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-666-8273. Address correspondence to: 3M Electronic Handling & Protection Division, 6801 River Place Blvd., Austin, TX 78726-9000. Our fax number is 1-800-826-8893.

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